

Title: Suspension file and method for the manufacture thereof.

The invention relates to a suspension file.

Suspension files are known and are used, for instance, to store paper in drawers and cabinets, such as desk drawers and filing cabinets. These are suitably provided with parallel suspension rails from which the
5 suspension files can be suspended with suspension hooks.

These known suspension files are manufactured from folded cardboard, with two opposing longitudinal edges of the cardboard being provided with a metal or plastic strip projecting on both sides to form the above suspension hooks. Such suspension files are expensive because the
10 metal strips must be provided, while, moreover, they are vulnerable as a result of the cardboard and the connection with the strip.

The invention contemplates to provide a suspension file. In particular, the invention contemplates to provide a suspension file which is less vulnerable than the known suspension file and, moreover, is preferably
15 relatively inexpensive in manufacture. These and further objects are at least partly achieved with a suspension file according to the invention.

A suspension file according to the invention is characterized by the features according to claim 1 and is substantially manufactured from plastic. Preferably, a suspension file according to the invention is
20 characterized in that it is injection molded, at least manufactured in a mold in one piece, with hinging means being co-formed, in particular as so-called living hinges. Thus is achieved in one go a suspension file which can be easily folded and can be suspended in a suitably designed arrangement, such as a desk or filing cabinet or the like.

25 In a suspension file according to the invention, the hook means are preferably designed as extensions of a longitudinal edge of a closing surface,

with the longitudinal edge being slightly thicker than the thickness of the closing surfaces. This ensures that the suspension file can easily be suspended, is sufficiently stiff, while the closing surfaces are relatively flexible and, moreover, require little material. In a suspension file according to the invention, the hinging means comprise at least one and preferably more than one living hinge, for instance two or three living hinges extending substantially parallel to each other. Thus a suspension file can easily be adapted in thickness to the matters to be stored therein, such as papers. It is preferred that on at least one side, in particular an outer side of a closing surface, a suspension file is provided with surfaces which can be written on, so that notes can easily be made on the suspension file, for instance concerning the contents thereof.

In a longitudinal edge of a closing surface of a suspension file according to the invention, an insert can easily be included, for instance a metal or plastic stiffening strip, around which plastic is preferably completely or partly injected. Optionally, a transponder may be included as insert, with which the suspension file can be made individually traceable.

A suspension file according to the invention may, for instance, have an opened length between 400 and 550 mm and a width between 270 and 350 mm; such that paper of A4 format can easily be received therein, while the suspension file can be suspended in existing filing cabinets and the like. Of course, these dimensions should in no way be understood as limitative and may be adjusted in accordance with the desired use of the suspension file.

A suspension file according to the invention is preferably substantially injection molded in flat condition, which facilitates manufacture.

The invention further relates to a label holder for a suspension file according to the invention, provided with a clamping profile which can fittingly be clamped to an upper edge of a closing surface.

The invention further relates to a method for manufacturing a suspension file, characterized by the features according to claim 11.

The use of a mold with a mold cavity in which at least one movable wall part of the mold cavity is provided gives the advantage that plastic can be introduced into the mold cavity with relatively little counterpressure, at least a particularly favorable mold flow index (MFI), while during or after the plastic is introduced into the mold cavity, the above movable wall part can be moved to a position in which the desired relatively small wall thickness of at least the closing surfaces is achieved. During this movement, the plastic is displaced by the moving wall part, so that complete filling of the mold cavity is achieved. Thus can be obtained a wall thickness which is not otherwise possible with mold forms without particularly high injection pressures and/or particularly high closing pressures of the mold being necessary.

In a method according to the present invention, the mold may be of such design that the hinging means are substantially formed by the or each movable part. This offers the advantage that during injection of the plastic the hinges as such do not form a flow impediment to the plastic, while relatively thin film hinges, at least living hinges, can be formed.

In a further advantageous embodiment, a method according to the invention is characterized by the features according to claim 14.

In such an embodiment, after injection of the plastic, the closing surfaces are brought to thickness by movement of the or each movable wall part. The wall thickness of the closing surfaces thereby becomes particularly small. An additional advantage of a method according to the invention is that stresses in the plastic and hence in the final product can be controlled very well, can particularly be reduced to a minimum, so that undesirable deformations of the final products are prevented.

In explanation of the invention, exemplary embodiments of a suspension file, label holder and method according to the invention will be elucidated in more detail with reference to the drawing. In this drawing:

Fig. 1 shows, in perspective view, an opened suspension file according to the invention;

Fig. 2 shows, in perspective view, a closed suspension file according to the invention;

Figs. 2A-2E show details of embodiments according to the invention;

Fig. 3 shows, in perspective view, a label holder according to the invention;

Fig. 4 schematically shows, in cross-sectional view, a mold for use of a method according to the invention, in a first embodiment;

Fig. 5 shows, in cross-sectional view, a second embodiment of a mold for use of a method according to the invention;

Fig. 6 shows, in opened and closed condition, a file according to the invention, in an alternative embodiment;

Fig. 7 shows the file of Fig. 6, with filling;

Fig. 8 shows a clamping device for a file according to the invention;

Fig. 9 shows an assembly according to the invention, comprising a box and a number of suspension files;

Fig. 10 schematically shows, in a number of views, suspension files according to the invention, suspended and unfolded; and

Fig. 11 schematically shows, in side view, a part of a file in a further embodiment.

In this specification, similar or corresponding parts have similar or corresponding reference numerals.

Fig. 1 shows, in unfolded condition, a suspension file 1 according to the invention, comprising a first closing surface 2 and a second closing surface 3, mutually connected by hinging means 4. On the side 5 opposite the hinging means, each closing surface is provided with a thickened

longitudinal edge 6, which is provided on both sides with a projecting part 7 forming a hook means 8 with which the suspension file can be suspended in the conventional manner. On the side facing the hinging means 4, each hook means 8 is suitably provided with an appropriate profile 9.

5 In the embodiment shown in Fig. 1, the hinging means 4 comprise three hinging lines 4A-C extending parallel to each other, which each form a living hinge 10A-C, schematically shown in Fig. 1A in side view. Between the hinging lines 10A, 10B and 10B, 10C, edges 11 are provided. When folding up the suspension file 1, the two closing surfaces 2, 3 can thus be
10 folded against each other, along either the middle folding line 10B or the two outer folding lines 10A, 10C or along all three folding lines. Also, the living hinges 10 may be of such design that the middle living hinge 10B is located on another side than the two other living hinges 10A, 10C, such that the folding direction thereof is opposite. This means that when the
15 suspension file 1 is completely folded up, the two edges 11 will be folded between the two closing surfaces 2, 3, as shown in Fig. 2B.

A suspension file 1 as shown in Fig. 1 is injection molded in one piece from plastic, for instance polyethylene, PET, polypropylene or another appropriate plastic in which living hinges can be formed. Of course,
20 mixtures of plastics may also be used. A method therefor will be described below with reference to Figs. 4 and 5.

Fig. 2 schematically shows, in perspective view, a suspension file 1 according to the invention, in substantially folded-up condition, with only one living hinge 10 being used. On the outer side of the second closing
25 surface 3, a number of raised surfaces 12 are arranged in relief in rows and columns. In an alternative embodiment, the surfaces 12 may also be provided by, for instance, in-mold-labeling, or stickers for sticking on thereof may be co-delivered.

As shown, the longitudinal edges 6 are slightly thicker than the rest
30 of the closing surfaces 2, 3. Fig. 2A schematically shows, in cross-sectional

side view, an upper part of a closing surface 2, from which it is clear that the longitudinal edge 6 has a greater wall thickness D_1 than the further closing surface 2, the thickness of which is indicated by D_2 . The wall thickness D_2 is, for instance, half or a third of the wall thickness D_1 .

5 Suitable ratios can easily be selected, for instance on the basis of the used plastic, the dimensions of the suspension file 1, the desired bearing strength of the longitudinal edges 6 and the profile form thereof. Of course, other than the shown rectangular cross-sections may be used.

Fig. 2B schematically shows a lower end of a suspension file 1
10 according to the invention, in particular hinging means 4 comprising three living hinges 10A-10C. At a greater load on the suspension file 1, the two closing surfaces 2, 3 will be moved farther apart to provide more space.

Fig. 2C schematically shows a part of a longitudinal edge 6 of a suspension file 1, in which the hook means 8 are formed by the end of a
15 strip 13, which is included in the longitudinal edge 6 as insert, for instance a metal or plastic strip. The plastic is flowed around the strip, leaving clear the above hook means 8. This easily enables further increase in bearing strength.

Fig. 2D shows, in side view, a part of an upper edge of a suspension
20 file 1 according to the invention. The side walls 2, 3 are formed by a plastic sheet, for instance extruded or injection molded. This sheet may also be designed as shown in Fig. 11. The upper longitudinal edge 70 of each side wall 2, 3 is provided with a row of lips 71 between which recesses 72 are provided. The longitudinal edge 70 thereby resembles a row of battlements.
25 The edge 6 is, for instance, injection molded and connected with the sheet, at least the side walls 2, 3, by the above lips 71. The sheet may be fixed against the edge 6, for instance by gluing, welding or the like. Preferably, the edge 6 is injection molded around the lips with an apparatus and method to be described below. The edge is preferably slightly bent, such that
30 when cooling an eventually substantially straight edge 6 is obtained. The

sheet from which the side walls are formed may be slightly stretched previous to injection molding, so that the length thereof, in stretched condition, substantially corresponds with the length of the edge 6 immediately after injection molding, with the sheet assuming its original length again on shrinkage of the edge. This method is also usable in other embodiments, but the use of the row of battlements 70 gives the advantage that fewer stresses occur and the sheet is more easily kept flat.

Fig. 2E shows, in side view, an advantageous embodiment of the edges 6 with a part of the side walls 2, 3. The edges 6 are formed as hollow profiles, which may lie against and/or over each other and are relatively stiff at relatively small wall thicknesses. The wall thicknesses of the profiles are preferably relatively regular and everywhere equal, so that a regular shrinkage is obtained when cooling. The profiles may be extruded, but are preferably injection molded. In the shown exemplary embodiment, a first edge 6 is formed by a slightly U-shaped profile 73 pointing down with the legs. A long leg 76 is provided at the lower end with an edge 75 in which a longitudinal edge 70 of a side wall 3 is attached, for instance by gluing, welding, co-injection molding, pressing or the like. Optionally, the longitudinal edge 70 may be formed as shown in Fig. 2D. The other edge 6 is formed by a second profile 74 having a substantially L-shaped cross-section, with the long leg 77 pointing down. The lower edge 75 thereof is provided with a profile in which or against which the upper longitudinal edge 70 of the side wall 2 is attached, in a manner described before. The short leg 78 of the profile 74 may rest on the upper surface 79 of the other profile 73. These profiles are, through their form, relatively stiff and dimensionally stable, while, in cooperation, they lead to a good closure and, moreover, greater stiffness. Optionally, the profiles 73, 74 may be provided with cooperating locking means, such as projections, holes, lips, clicking edges and the like, for a still better closure.

Fig. 3 shows a label holder 14 according to the invention, for instance formed from an extruded profile, provided with a clamping profile 15, which can clampingly be clamped to the longitudinal edge 6 of the suspension file 1, while the opposite longitudinal edge 16 is bent over, such that an edge 17 thereof extends approximately parallel to a body part 18, at which the edge 16 and the clamping profile 15 are provided. Between the edge 17 and the body 18, for instance, a paper may be slid on which text can be provided.

Fig. 4 shows a first embodiment of a mold 20 for use of a method according to the invention for the manufacture of a suspension file 1. This mold 20 comprises a first stationary closing part 21 and a second movable closing part 22. Between the closing parts 21, 22, a mold cavity 23 is formed, which is at least partly bounded by a movable wall part 24, for instance a plate suspended in the mold cavity 23 by means of piston-cylinder assemblies 25. Fig. 4 shows the plate 24 in a withdrawn position, such that the mold cavity 23 has a relatively large volume. Between the side 26 of the plate 24 facing the mold cavity 23 and the opposite wall 27 of the first mold part 21, a relatively great distance D_3 is provided, in the shown embodiment greater than the thickness D_2 of the longitudinal edges 6. In the middle of the plate 24, three ribs 28 are provided with which the living hinges can be formed. The length L of the plate 24 corresponds with the distance L between the longitudinal edges 6, in the unfolded position shown in Fig. 1. On both sides of the plate 24, parts 29 forming the longitudinal edge are provided. In the first mold part 21, a feed opening 30 is provided through which, by means of injection molding means, schematically shown in Fig. 4 as a pump 31, plastic can be introduced into the mold cavity 23. Because the distance D_3 is relatively great, the plastic can be introduced into the mold cavity 23 with relatively little pressure, the flow path being relatively limited, so that a particularly advantageous MFI is obtained.

After bringing the plastic, sufficient to form the suspension file 1, into the mold cavity 23, with the mold in the position shown in Fig. 4, the feed

opening 30 is preferably closed, and the plate 24 is moved forward by means of the piston-cylinder assemblies 25 to a slid-forward position, as partly schematically shown in Fig. 4A. It is clear that the distance between the plate 24 and the opposite wall 27 is reduced to the wall thickness D_1 of the two closing surfaces 2, 3, while the distance D_2 from part 29 forming the edge part has remained equal. Plastic is pushed away by the plate 24 into the parts 29 forming the longitudinal edge. Thus, complete filling of the mold cavity 23 is obtained, the closing surfaces 2, 3 being particularly small, in particular smaller than the MFI of the complete flow path from the inlet opening 30 into the longitudinal edge 6 when normally injection molding without movable wall part 24. Moreover, this enables reduction of the stress in the wall parts. Besides, the living hinges 10 are simultaneously formed by the ribs 28.

Fig. 5 schematically shows an alternative embodiment of a mold 20 according to the invention, a movable wall part 24 in the form of a slide being provided in the fixed mold part 21. The inlet opening for the plastic is provided in the movable part 22. Of course, this may also be conversely designed. In this embodiment, the side of the slide 24 facing away from the mold cavity 23 is provided with two oppositely inclined surfaces 31 opposite a flat running surface 32. Between the running surface 32 and the inclined surfaces 31 are provided wedges 33 with complementary inclined surfaces 31. The wedges 33 are movable in the direction P by means of piston-cylinder assemblies 25. It will be clear that when moving the wedges 33 toward each other, the plate 24 will be brought to a slid-forward position, that is to say will be moved in the direction of the opposite surface 35 of the mold cavity 23. With such a mold 20, the wall thickness of the closing surfaces 2, 3 can, in a manner described before, be reduced to the desired wall thickness D_1 , while during injection of the plastic the distance between the slide 24 and the opposite surface 35 can be relatively great, for instance a multiple of the above wall thickness D_1 , so that the plastic can be

brought into the mold cavity with relatively little pressure. Moreover, the use of the wedges 33 very easily enables movement of the slide 24, with little force.

In an advantageous embodiment, the slide or plate 24 is, in a method according to the invention, moved so rapidly that adiabatic heat development occurs in the plastic, so that the flow behavior of the plastic is advantageously affected.

Figs. 6 and 7 show, in opened and closed condition, a file 1 according to the invention, which is provided with closing surfaces 2, 3 which may be relatively stiff. Hook elements 8 are co-formed in one piece in partly hollow longitudinal edges 6. The hinging means 4 comprise two parallel hinges 4. Near one of the hinges 4, a clamping element 40 is attached to a closing surface 2 by means of slightly mushroom-shaped pins 41 fitting into openings 42 in a base element 43 of the clamping element 40. The clamping element 40 is shown in more detail in Fig. 8.

In this embodiment, each closing surface 2, 3 is provided with a raised edge 44 between the hinges 4 and the longitudinal edge 6. In the closed condition of the suspension file 1, as shown above in Figs. 8 and 9, these edges 44 fall against and partly over each other, to close an inner space of the suspension file 1. Pins 45 are provided to ensure good closure. In the longitudinal edge 6, a transparent window 46 may be included behind which an identification plate or the like can be inserted. Furthermore, closing means (not shown) may be provided to keep the suspension file closed.

As shown in Fig. 7, sheets of paper 48 or the like may be put on pins 47 of the clamping element 40.

Fig. 8 shows a clamping element 40 in an advantageous embodiment. This comprises a base element 43 with openings 42 having a keyhole form. Arranged on the base element 43 are hollow pins 47, while via elastic, flexible arms 51 a closing surface 49 is connected with the base element 43.

On the closing surface 49, pins 50 are provided which clampingly fit into the hollow pins 47, so that the closing surface is fixed on the base element 43, optionally enclosing the paper. The base element 43 may be slid with the openings 42 over the pins 41, for attachment purpose. If desired, this may
5 be designed so as to be detachable.

Fig. 9 shows an assembly 52 according to the invention, comprising a box 53 and a series of suspension files 1, for instance according to the invention. The box 53 can partly be folded or set up and comprises, in the shown embodiment, a tray-shaped bottom part 54 and two pairs of side
10 walls 55, 56 pivotable relative thereto. In the shown example, the side walls are connected with the bottom part 54 via living hinges, but may also be loosely placeable thereon. Fig. 9 shows, in five steps, the setting up and filling of the box 52, from bottom left counterclockwise. A stack of suspension files 1 is placed in the bottom part 54, after which the side walls
15 55, 56 are folded thereover. The two long side walls 55 are set up, as are the short side walls 56. Fitting fingers 59 and holes 60 are provided to couple the walls 55, 56. In the short walls 56, on the side facing inward, ledges 61 or the like are provided, so formed and dimensioned that the suspension files 1 can be suspended therefrom with the hook means 8, as shown in
20 Fig. 9 top left. This results in an assembly which can serve both for storage and transport of folded suspension files and for suspending suspension files in, for instance, a cabinet, drawer or the like. A box according to the invention may, of course, be manufactured from any material, such as cardboard or the like, but is preferably manufactured in one piece from
25 plastic. In an assembly according to the invention, regular cardboard suspension files may also be included.

Fig. 10 shows, in a number of views, a suspension file 1, in opened and in closed condition, suspended from rails 62.

Fig. 11 shows a part of a suspension file 1 according to the invention,
30 in a further alternative embodiment. In particular, an end 5 with a

longitudinal edge 6 of a closing surface 2, 3 is shown. In this embodiment, the closing surfaces 2, 3 are manufactured as an at least partly plastic sheet 63, laminated in the shown embodiment. For instance, a middle sheet 64 of cardboard, paper, plastic or the like, optionally provided with images, text
5 or the like and two-sidedly provided with a transparent cover layer 65. The sheet is folded to form the hinging means 4. At the end 5, a longitudinal edge 6 is provided by, for instance, gluing a strip 66 thereon. Preferably, the strip is formed by injection molding technique using the laminate 63 as insert. Alternatively, the strip 66 may also be fixed by heat sealing, after it
10 has been manufactured, for instance, by injection molding. A design as shown in Fig. 11 is, for instance, advantageous because of relatively low cost, appearance or the like.

In a suspension file 1 according to the invention, the longitudinal edge 6, at least a strip 66 and/or a closing surface 2, 3, may be provided,
15 near the longitudinal edge 6, with a projection 67 or the like, which can rest on a rod 62. This can prevent the suspension files 1 from tilting and standing, at least hanging crooked. Optionally, such a projection may also be provided on the label holder 14.

The invention is in no way limited to the exemplary embodiments
20 shown in the specification and drawing. Many variations thereof are possible within the scope of the invention defined by the claims.

For instance, the longitudinal edges 6 may have other profiles, for instance partly open on one side, as in the form of a U-profile or I-profile. Also, several movable wall parts 24 may be provided, which may be moved
25 successively or simultaneously, while, moreover, movement of the movable wall parts is possible during insertion of the plastic, which may be advantageous if the plastic must be kept moving during injection, so as to prevent premature solidification. Other inserts may be provided as well, for instance transponders with which the suspension files can become
30 electronically traceable. It will be clear that all combinations of different

parts and features of the shown embodiments also fall within the scope of protection of the claims.

A mold according to the invention may also be of vertical design. The hinging means may be designed as film hinge.

5 These and many comparable variations are considered to fall within the scope of the invention defined by the claims.